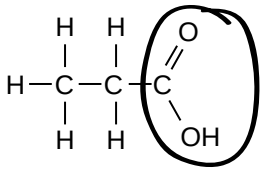
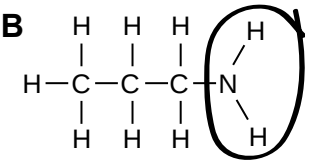
# ANSWERS: Level 2 Organic Reactions flow charts

**1.**

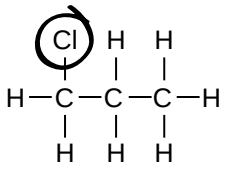
**A**



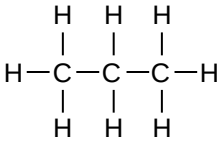
**B**



**C**



**D**



Reagent X is concentrated sulfuric acid, conc $H_2SO_4$, or c.$H_2SO_4$.
Reagent Y is alcoholic potassium hydroxide, KOH (*alc*).or alcoholic sodium hydroxide, NaOH (*alc*).

**2.** All three reactions are substitution reactions. In all three reactions an atom or group of atoms is being replaced with another atom or group of atoms.
In **Reaction One;** a Br atom replaces an H atom. UV light is necessary.
In **Reaction Two;** a Cl atom replaces the OH group. No conditions are required.
In **Reaction Three;** the Cl atom is replaced by $NH_2$. No conditions are required.

Two layers form in Reaction One as hexane is non-polar and the product (bromohexane) is effectively also non-polar. The water from the bromine water is polar and therefore the non-polar organic reactant and product will not dissolve in the water; because of this, two layers form as this polar and non-polar layer do not mix.

**3.**

| Reagent | Formula of reagent / conditions | Type of reaction |
|---|---|---|
| A | $H_2O/H^+$ | addition |
| B | $PCl_5$ / $PCl_3$ / $SOCl_2$ | substitution |
| C | KOH (alc) | elimination |

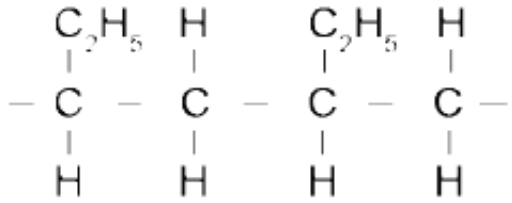
**4.** Reaction with $PCl_5$ is a **substitution** reaction.
The hydroxyl group (–OH) is replaced by a chloro group (–Cl). The product is $CH_3CH_2CH_2CH_2Cl$
The functional group in the product is a chloro group / chloroalkane (haloalkane).

Reaction with acidified dichromate is **oxidation** as the alcohol is oxidised to a carboxylic acid.
The product is $CH_3CH_2CH_2COOH$
The functional group in the product is carboxylic acid.

Reaction with concentrated $H_2SO_4$ is an **elimination** reaction.
A hydrogen atom and the –OH group on (adjacent) carbon atoms are removed forming a (carbon-to-carbon) double bond. The product is $CH_3CH_2CH=CH_2$
The functional group in the product is a (carbon-to-carbon) double bond / alkene.

**5.**

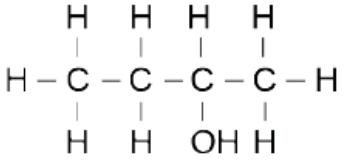
**i)**



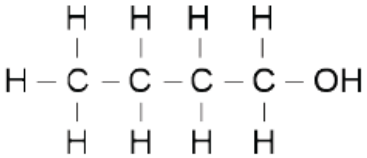
**ii)** $H_2$ (/Pt)

**iii)** $PCl_3$ / $PCl_5$ / $SOCl_2$

**b) i)**



**C**



**D**

**6.**

Compound A is $CH_3–CH_2–CH_2–OH$

Compound B is $CH_3–CH_2–CH_2–NH_2$

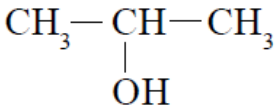
Reactant P is HCI

Reactant Q is concentrated $H_2SO_4$

Reactant R is HCl

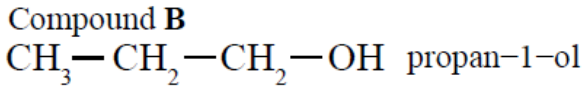
**7.**

Compound **A**



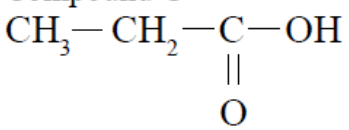
propan–2–ol

Compound **B**



propan–1–ol

Compound **C**

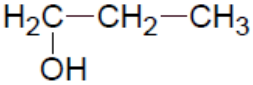
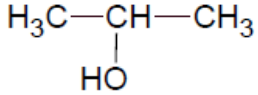
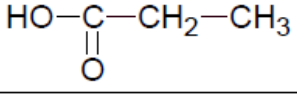


propanoic acid

Reagent **D** $Cr_2O_7^{2-}$ / $H^+$ **OR** $MnO_4^-$ / $H^+$

Reagent **E** NaOH

**8.**

| | | |
|---|---|---|
| **A** |  | propene<br>prop-1-ene<br>1-propene |
| **B** |  | propan–1–ol<br>1-propanol |
| **C** |  | propan–2–ol<br>2-propanol |
| **D** |  | propanoic acid |